DERWENT-ACC-NO: 1991-255031

DERWENT-WEEK: 199135

TITLE: Irregularly shaped article cover - comprises heat-shrinkable film welded into shape of article

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PRIORITY-DATA: 1990GB-0004221 (February 24, 1990)

PATENT-FAMILY:

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APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
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INT-CL (IPC): B31B049/04

ABSTRACTED-PUB-NO: GB 2241195A

BASIC-ABSTRACT:

Cover is made from pre-oriented heat-shrinkable plastic film and is shaped by welding to have the same basic shape as the article(3), rather than being a parallel-sided tube unlikely to shrink down closely about the article.

USE - Applying dustproof, waterproof, or electrically insulating covers to irregularly shaped components.

CHOSEN-DRAWING: Dwg.3/4

TITLE-TERMS: IRREGULAR SHAPE ARTICLE COVER COMPRISE HEAT SHRINK FILM WELD SHAPE

ARTICLE

DERWENT-CLASS: A35 P72

CPI-CODES: A11-C01A1; A12-P01A; A12-P04;

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Multipunch Codes: 014 03- 331 354 428 429 435 446 454 455 476 477 494 50& 502 506 509 53& 532 533 535 541 547 575 596 651

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B31B 49/04

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US 4116116 A US 4053346 A

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INT CL[4] B31B

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(54) Manufacture of articles from flat sheet heat-shrinkable plastics

(57) This invention describes a method of producing articles from thin sheets of pre-oriented heat shrinkable plastics material that could not be manufactured by other techniques such as injection moulding.

The process is particularly suitable for making parts for the covering of irregular shaped articles that need to be screened from dust or moisture or electrically insulated with a heat-shrink product.

The method involves the cutting of developed shapes from the flat material and the selective welding along a straight or irregular line to form the shape of best fit to the component to be covered. This will ensure a good fit with even shrink when the cover is heated to the shrink temperature.

The sheet may include an adhesive coating that is activated during the shrinking process.

DRAWINGS

Figure 1

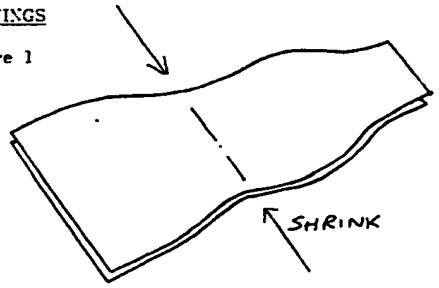
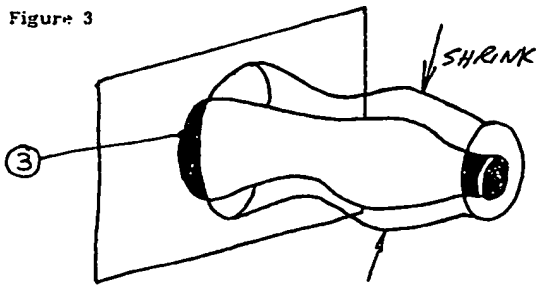


Figure 3



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DRAWINGS

Figure 1

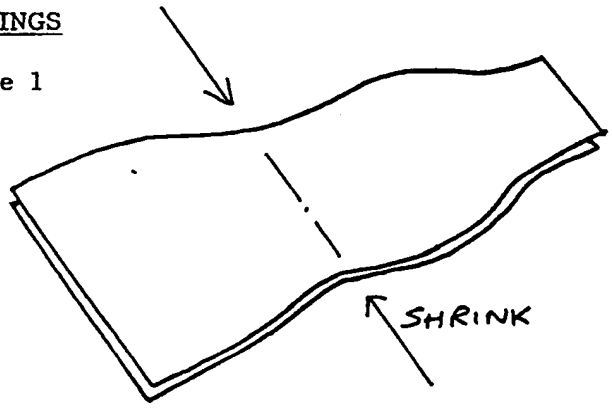


Figure 2

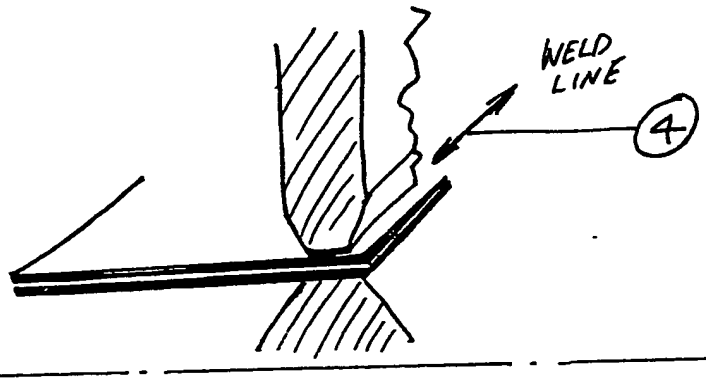


Figure 3

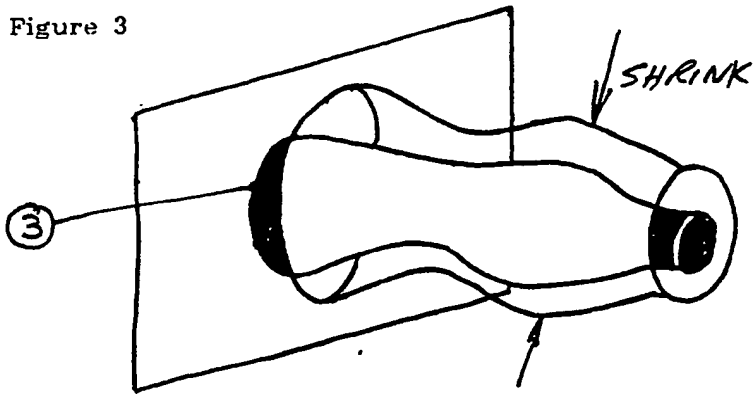
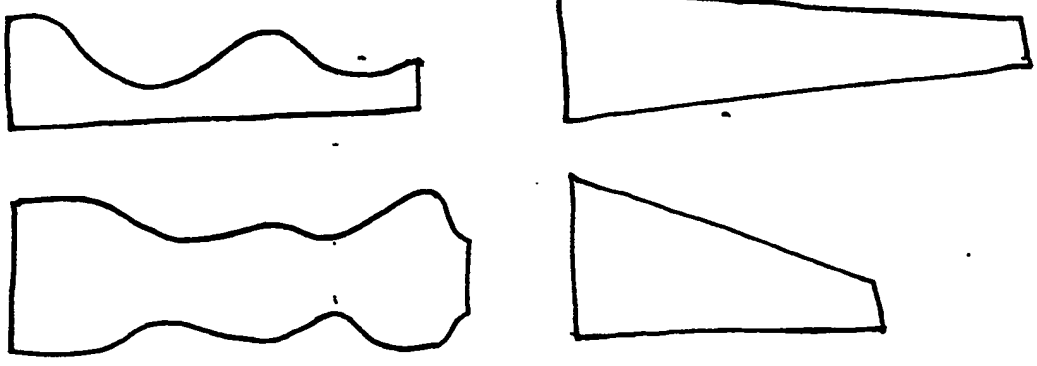


Figure 4



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MANUFACTURE OF SHAPES IN FLAT SHEET HEAT-SHRINKABLE PLASTICS

This invention describes a method of producing shapes in thin sheets of pre-oriented heat shrinkable plastic material that could not be manufactured by other techniques such as injection moulding.

The process is particularly suitable for making parts for the covering of irregular shaped articles that need to be screened from dust or moisture or electrically insulated with a heat-shrink product.

Plastic moulded parts have been available for several years but are costly to produce and their manufacture incurs high tooling charges. The method of manufacture is ideal for low volume, highly specialised components, such as those required for military applications, but does not suit low cost high volume production. Such heat-shrinkable shapes are only available in a very limited range of plastics and the thickness of the component is dependant upon the shape and size of the mould and the moulding characteristics of the polymer from which it is produced. The shrinking properties of these parts are not versatile and are affected by both the size and shape of the component required. The shrink characteristic also has to be introduced after the moulding process which means an additional time consuming process.

According to the present invention, many of these problems are successfully overcome. The invention claims a new process in which items are formed from pre-oriented heat-shrinkable materials in thin sheet form. The shapes are developed to form the best fit possible so that when the cover is heated to the shrink temperature the cover will uniformly shrink to give a tight fit along the length of the component being covered. The materials are available and can be produced with both single and bi-axial shrink orientation. It is relatively simple to vary the amounts of heat activated shrinkage in sheet and film. The lines of stress related to the shrink memory can be placed in the most appropriate position in relation to the application of the article and its shape. This means that in production, the introduction of the heat-shrink properties does not have to be done on a piece part basis, but it is done in bulk beforehand, thus eliminating a costly process.

The process involves the cutting of shapes from the flat sheet or film and the formation of the finished shape by the application of a welding technique to complete the process. The materials may also be coated with an adhesive film that is activated by temperature, slightly below the shrink temperature, for adhesion to the component being covered as an aid to waterproofing or other reason.

The temperatures required for the successful welding of plastics necessitates the melting of the polymer and this would normally cause activation of the shrink memory. However, by the controlled application of sonic energy the heat can be limited to an exact area of the material which can be maintained under pressure at the weld line both before, during the welding process and, whilst the material at the weld line cools to ambient temperature. Thus only the actual weld line is de-activated but the heat-shrink properties of the remainder of the product will be unaffected by the welding process. Once the source of sonic energy is removed the transmission components can be quickly cooled to provide a fast cycle time.

Welding is achieved by the use of specially shaped ultrasonic welding heads, the transmission components, which apply the welding power to a localised region bounded by the shape of the welding heads. This is normally a knife edge with a flat tip about 2-5mm wide, but this may also be irregular along its length to suit the shape of the component and it may be of any suitable cross section, shape and thickness.
In this way the present invention prevents any unwanted shrinking of the material from taking place during welding which would otherwise most certainly take place with traditional welding techniques.

The process is an ideal way to produce the fabricated shapes as described in a very efficient and low priced repetitive manner. The machinery developed for the production of these parts takes successive parts in the form of cut shapes and processes them one after the other through the stages of welding.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which :-

Figure 1 shows an example of a shape cut from heat-shrinkable sheet with the direction of shrink memory indicated.

Figure 2 shows the pressure line along which the welding takes place and the tooling shape.

Figure 3 shows the finished article fitted to a component as a dust/waterproof cover.

Figure 4 shows a number of other application shapes.

Refering to the drawings, the cut shapes (1) are developed in flat form, in two pieces or folded, so that the finished article (2) will fit as well as possible to the profile of the component to be covered (3).

The cut shapes are then positioned under the welding head such that the weld line (4) will create the finished article with one or more welds. The weld line, once positioned, is clamped securely in a pressing operation and the sonic power is then applied. On completion of the welding, the article and the weld head are allowed to cool ready for the automatic introduction of the next cut shape.... and so on.

The finished article is shown fitted to the component (3) to be covered and by means of a uniform source of heat such as a hand blower or oven the cover will shrink in the direction of the shrink memory to fit the component tightly. The amount of shrink is determined by the amount previously introduced into the material during original manufacture of the sheet.

CLAIMS

1 A welded article made from pre-oriented heat-shrinkable thin, flat, plastic sheet, film.(1)

2 A welded article as in claim 1 that is formed into the desired shape by selective welding that does not alter the heat-shrinking properties of the finished article.(2)

3 A welded article as in claim 1,2 that has its direction of shrink memory chosen before the article is formed into the required shape.

4 A welded article as in claims 1 to 3 that is designed to fit a component of such irregular shape that a simple parallel sided tube will not have enough shrink to pull down on the component along its whole length. Such components will require shapes, from simple cones to complicated sheaths, as indicated in Figure 4.

5 A welded article as in claims 1 to 4 that is made possible by the current invention, whereas to produce such articles would be impossible by normal moulding techniques because the finished article could not be removed from a moulding tool and/or because the thickness of the plastic required would make it very difficult to get the molten plastic to feed around the cavities, under molding pressures, to reliably form the shape. Examples of such shapes are indicated in figure 4.

6 A welded article as in claims 1 to 5 that has an adhesive coating applied to the inside, or outside, of the material before the welding process. The adhesive being activated at temperatures below the heat-shrink temperature so that adhesion to the component surface takes place during the shrinking process.

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